Profile of Nutritional Status and Nutrient Intake among Children with Cerebral Palsy in Dr. Hasan Sadikin General Hospital Bandung

Zahra Fitrianti,[1] Ellyana Sungkar,[2] Lola Ilona Hamied[3]
[1]Faculty of Medicine Universitas Padjadjaran, Indonesia, [2]Department of Physical Medicine and Rehabilitation Faculty of Medicine Universitas Padjadjaran/Dr. Hasan Sadikin General Hospital Bandung, Indonesia [3]Department of Public Health Faculty of Medicine Universitas Padjadjaran, Indonesia

Abstract

Background: Children with Cerebral Palsy have abnormalities in the motoric function that cause feeding problems and higher energy requirements compared to normal children. These problems put the patients at risk of getting inadequate nutrient intake, leading to malnutrition and thus affecting the health outcomes. This study aimed to explore the nutritional status and nutrient intake among children with Cerebral Palsy.

Methods: Children with Cerebral Palsy who came for a rehabilitation program in the Department of Physical Medicine and Rehabilitation Dr. Hasan Sadikin General Hospital Bandung were recruited from September–October 2014. Descriptive quantitative study design was performed. Nutritional status was determined by body weight and body height or length if the children could not stand upright to calculate Z-scoreBMI-for-age and Length/Height-for-age according to WHO. Undernutrition was determined when Z-score≤ -2; stunting was designated as height below the average of their age; whereas wasting as a weight. A repeated 24 hours of food recall was used to measure nutrient intake.

Results: There were 18 children with Cerebral Palsy, consisting of boys (n=7) and girls (n=11). Only 33.3% of patients had good nutritional status, the others (n12; 67.7%) were under nutrition; of whom stunting (n7) was found, followed by wasting (n3) and both stunting and wasting (n2). These under nutrition patients had predominantly a lower energy and carbohydrate intake.

Conclusions: Most of the Cerebral Palsy children are in under nutrition status due to a low energy and carbohydrate intake, therefore, special attention in mother education for the food pattern of their children needs to be raised.

Keywords: Cerebral palsy, nutrient intake, nutritional status

Introduction

Cerebral palsy is a disorder of movement and posture caused by non-progressive injury or damage in the immature brain.[1] Cerebral palsy is the most common motoric abnormality in children which is marked by changes in muscle tones and posture whether in resting condition or voluntary contraction.[1,2] Cerebral palsy can be classified into four types based on an abnormality in muscle tones, namely spastic, dyskinetic, hypotonic, and mixed.[1]

Patients with cerebral palsy also have a problem in growth and nutrition.[3-5] The North American Cerebral Palsy Growth Project stated that at least 27% of patients with cerebral palsy suffer from malnutrition.[1] Malnutrition could happen when the nutrient intake can not fulfill one's metabolic needs. The energy needs of a cerebral palsy patient vary according to the type of cerebral palsy.[5] A non-ambulatory spastic quadriplegic cerebral palsy patient will have lower energy expenditure than normal children.[2,5] In contrast, an ambulatory cerebral palsy patient will spend more energy than normal children.[2,3] Motoric abnormalities can cause patients with cerebral palsy to have eating problems and difficulties to get food intake which can supply their energy need.[1,5,6]

Higher energy needs, eating problems, parents' lack of knowledge and bad eating

Correspondence: Zahra Fitrianti, Faculty of Medicine Universitas Padjadjaran, , Jalan Raya Bandung Sumedang Km. 21 Jatinangor, Sumedang, Indonesia, Email: zaarafit@gmail.com

habits can cause inadequate nutrient intake in patients withcerebral palsy.[5,7] Inadequate nutrient intake could result in poor nutritional status which can cause growth interference and worsen outcomes for patients with cerebral palsy.[4,5,8] The aim of this study was to describe the nutritional status and nutrient intake of patients with cerebral palsy in Dr. Hasan Sadikin General Hospital Bandung.

Methods

This study had a quantitative descriptive study design. The consecutive sampling was performed on children with cerebral palsy who came for a rehabilitation program in the Department of Physical Medicine and Rehabilitation in Dr. Hasan Sadikin General Hospital Bandung in September to October 2014 was recruited. Informed consent was signed by the parents of these children before taking part in this study. The parents were then asked about food and drinks that the patient had consumed in the last 24 hours, using repeated a 24- hour food recall method.

Food recall was conducted three times to assess the eating habit of the children; of which two times in the weekdays and once in the weekend, and the cycle was repeated once. The children cq. the parents who did not come in the designated time were contacted through phone, and they were dropped out from the study when they did not answer the phone.

Anthropometric measurement was performed, consisting of the body weight and body height; weight measurement was conducted using scales with 0.1 kg accuracy, whereas height measurement conducted using microtoise with 0.1 cm accuracy. The length measurement was performed in the children who could not stand upright using a measuring tape. Z-scores for BMI-for-age and Length/Height-for-age were then calculated using software WHO Anthro for children from 0 to 5 years old and WHO AnthroPlus for children from 5 to 19 years old. The nutritional status was classified based on the WHO recommendation. Patients were categorized as undernutrition when z-score≤ -2.

Nutrient intake was calculated from repeated 24-hour food recall data. The amount of food and drinks consumed by the patients was converted into grams using *daftar ukuran rumah tangga* (URT). This study had been approved by the Ethical Committee of Dr. Hasan Sadikin General Hospital.

Results

In total, 25 children with cerebral palsy were recruited, however, 5 were dropped out in the middle of the study because they could not be contacted for follow-up food recall and 2 parents decided to resign from the study since they moved out from the treatment program, resulting in 18 children as the respondents of this study, consisting of mostly girls (n 11; 61.1%). These children were from middle-class economic status, and the type of cerebral palsy was predominantly spastic quadriplegia (Table 1).

As shown in Table 2, the median age was

Table 1 The Characteristic of Children with Cerebral Palsy in Dr. Hasan Sadikin General Hospital recruited in September–October 2014

Characteristic	Total
Gender	
Boys	7
Girls	11
The economic status of the parents	
Upper class	3
Middle class	11
Lower class	4
Type of Cerebral palsy	
Spastic Hemiplegia	2
Spastic Diplegia	5
Spastic Quadriplegia	11

Table 2 The Z-score of Children with Cerebral Palsy in Dr. Hasan Sadikin General Hospital Recruited in September–October 2014

Characteristics	Boys (n=7)		Girls (n=11)	
	Median	Range	Median	Range
Age (years old)	**3.5**	**11.08**	**2**	**9.08**
Weight (kg)	16	20.1	10.3	12.5
Length or height (cm)	94	55	92	56
Z-score				
Length or Height-for-age	-4.14	4.77	-1,13	11.10
BMI-for-age	-0.68	7.08	0.12	10.57

3.5 (range 11.08) years old in boys and 2 (range 9.08) years old, with the youngest was 11 months old and the oldest was 12 years old. The nutritional status was classified based on Z-score, categorized as undernutrition when Z-score for BMI-for-age and/or Length or Height-for-age≤ -2. The result showed 12 children (66.7%) were undernutrition (Table 3), of whom 7 had height below average of children for their age known as stunting, and 3 other had weight below average although the height was normal, known as wasting, and 2 were both stunting and wasting (data not shown). Taken together, 10 of 12 children with undernutrition were those with cerebral palsy type spastic quadriplegia, came from lower economy class families (Table 4).

Energy intake in children with cerebral palsy with undernutrition was much less than those who were well-nourished; similar to carbohydrate, fat, and protein intake, in which the well-nourished patients consumed a lot more carbohydrate (Table 5).

Food recall in this study had been performed in patients from different economic status, with different level of knowledge. A lot of patients' mothers admitted that their children were very difficult to feed. One said that she had to chase her child every time she fed him, and several other mothers admitted that their children only ate 3 until 5 spoons in every meal. Mothers who had moderate knowledge about cerebral palsy clearly explained which food their children were allowed to eat and which were not, but even they still had difficulties in feeding their children. In the end, these mothers allowed their children to eat anything they wanted, in the hope for them to still eat and not to starve. The mothers cared less about whether the food had enough nutrition or not.

Daily meal frequency determined the nutrient intake in patients with cerebral palsy. Eight of twelve patients with undernutrition ate less than three times a day. One patient almost always vomited her food, another patient had oromotor impairment; causing him difficulties to eat. Another patient was sick when food recall had been asked and the rest were more likely refused to be fed. All of these reasons made mothers less patient and easier to feel tired once they fed their children and decided to only give food two times a day, either morning and noon or morning and night.

The economic status of cerebral palsy patients' family was not the main factor affecting nutrient intake but still playedan important factor. All patients who came from the low economy class family in this study suffered entirely from undernutrition, which they had meals with bad composition, consisting of rice and few side dishes two times a day, with or without a snack in between. The reason was that their family condition had made this impossible to give their children enough nutritious food. One patient with cerebral palsy type spastic quadriplegia from

Table 3 The Distribution of Nutritional Status Based on Gender

Nutritional status	Male (n=7)	Female (n=11)	Total (n=18)
Undernutrition	**5**	**7**	**12**
Well-nourished	2	4	6

Table 4 The Distribution of Nutritional Status based on the Type of Cerebral Palsy and Economic Status

	Undernutrition (n=12)	Well Nourished (n=6)	Total (n=18)
Type of Cerebral Palsy			
Spastic Hemiplegia	1	1	2
Spastic Diplegia	1	4	5
Spastic Quadriplegia	10	1	11
Economic status			
Upper class	2	1	3
Middle class	6	5	11
Lower class	4	0	4

Table 5 The Nutrient Intake Profile of children with Cerebral Palsy in Dr. Hasan Sadikin General Hospital recruited in September–October 2014

	Undernutrition (n=12)		Well nourished (n=6)	
	Median	Range	Median	Range
Energy Intake (kkal)	767.5	951.1	955.5	571.5
Protein (gr)	33.2	45.8	36.5	21.4
Fat (gr)	26.1	49.2	27.9	18.9
Carbohydrate (gr)	116.5	139.8	128	136.6

upper economy class family was found to suffer from undernutrition; she had quite a difficulty to eat so the mother admitted feeding her child anything without concerning nutritional composition to keep her child fed.

Discussion

The result of this study has shown that more than half (66.7%) of children with Cerebral Palsy suffer from undernutrition. Patients with Cerebral Palsy have a high risk of undernutrition due to abnormality in motor function which results in eating problems and higher energy needs than normal kids.[3,5] Moreover, patient with more severe motor abnormality has a higher risk.[3] Of our patients with Cerebral Palsy who was in undernutrition condition, most (58%) of them were stunted, the other (25%) were wasted, and the rest suffer from stunting and wasting, confirming the study results that Cerebral Palsy patients have lower anthropometric measurement compared to the normal children in their age.[6,9]

Undernutrition in our study is affecting ten of twelve (83%) cerebral palsy patients with spastic quadriplegia type. This result is consistent with study conducted by The North American Cerebral Palsy Growth Project; undernutrition is suffered in around one-third of cerebral palsy patients with hemiplegia and diplegia type, and more than two-third patients with quadriplegia type, respectively.[1] Patients with more severe type of cerebral palsy, commonly spastic quadriplegia type, tend to have difficulty in fulfilling their energy needs and nutrition.[5] These patients have more complicated functional and motoric impairments, therefore, it is more difficult to get adequate food intake. Moreover, these patients have higher energy needs than normal children due to the greater inefficiency of muscle action.[3]

The nutritional status of patients with cerebral palsy is associated with the nutrient intake which is obtained from food and drinks and also their eating habits. Furthermore, the eating habit of patients with cerebral palsy is influenced by the family factor, the degree of motoric impairment and eating ability of the patients,[4,6,8] especially those with more severe motoric impairment, they are depending on their parents to get food.[6] The presence of eating problems such as always vomiting food,

long eating time, food rejection, etc. can make parents lose their patience and finally give the fewer amount of food than it should be.[6] Mothers' knowledge about the disease itself also affects the amount of nutrient intake the patients will get.[6]

Patients with cerebral palsy who suffer from undernutrition have lower energy and carbohydrate intake than those who are well nourished. However, fat intake in cerebral palsy patients with undernutrition does not differ much with cerebral palsy patients who are well-nourished. This is due to the fact that the food consumed by the patients in the undernutrition group is high in fat content.[7] Patients who suffer from undernutrition are less likely to eat rice and side dishes, thus their mothers allow them to buy outside meals, consistent to study result that shows the diet of patients with cerebral palsy who suffer from undernutrition is high in fat and low in carbohydrate.[7]

The diet among Cerebral Palsy patients which has a high content in fat and low in carbohydrate, and additionally with milk and other sweet drinks which is consumed using bottles due to lack of ability to drink, may cause problems to a dental condition, among other dental caries.[5] Interestingly, this dental problem has not been found in most of the Cerebral Palsy patients.[10] In this study, only two subjects found to suffer from dental caries.

Nutrient intake and nutritional status of patients with Cerebral Palsy are also influenced by the eating ability and eating habit. Cerebral Palsy patients with severe impairments who are fed orally have lower anthropometric measurement than other patients with milder impairments, or with same impairments but fed by gastrostomy tube.[9]

The limitation of this study is that the eating ability and habit in patients in our study are not explored. All eighteen patients have a variety of eating ability and problems, such as not being able to hold their food, can not eat and drink by themselves, and also difficulty in swallowing. Studies in eating ability and habit in patients with Cerebral Palsy are encouraged. The other limitation is that the measurement for Z-score uses the standard charts for normal children; no Z score special for patients with Cerebral Palsy has been developed yet.

To conclude, most children with Cerebral Palsy in our study suffer from undernutrition due to inadequate nutrient intake, predominantly consisting of low energy and carbohydrate intake. Education in mothers about the disease itself needs to be raised and psychological family support needs special attention for better food intake and food pattern of their children.

References

1. Mukherjee S, Gaebler-Spira DJ. Cerebral palsy. In: Braddom RL, editor. Physical medicine and rehabilitation. 4th ed. Philadelphia: Saunders Elsevier ; 2010. p. 1243–61.
2. Bell KL, Davies PS. Energy expenditure and physical activity of ambulatory children with cerebral palsy and of typically developing children. Am J Clin Nutr. 2010;92(2):313–9.
3. Andrew MJ, Sullivan PB. Growth in cerebral palsy. Nutr Clin Pract. 2010;25(4):357–61.
4. Henderson RC, Grossberg RI, Matuszewski J, Menon N, Johnson J, Kecskemethy HH, et al. Growth and nutritional status in residential center versus home-living children and adolescents with quadriplegic cerebral palsy. J Pediatr. 2007;151(2):161–6.
5. Cloud H. Medical nutrition therapy for intellectual and developmental disabilities. In: Mahan LK, Escott-Stump S, Raymond JL, Krause MV, editors. Krause's food & the nutrition care process. 13th ed. Philadelphia: Elsevier Saunders; 2012. p. 1020–40.
6. Grammatikopoulou MG, Daskalou E, Tsigga M. Diet, feeding practices, and anthropometry of children and adolescents with cerebral palsy and their siblings. Nutrition. 2009;25(6):620–6.
7. Lopes PAC, Amancio OMS, Araujo RFC, Vitalle MSdS, Braga JAP. Food pattern and nutritional status of children with cerebral palsy. Rev Paul Pediatr. 2013;31(3):344–9.
8. Kim JS, Han ZA, Song DH, Oh HM, Chung ME. Characteristics of dysphagia in children with cerebral palsy, related to gross motor function. Am J Phys Med Rehabil. 2013;92(10):912–9.
9. Day SM, Strauss DJ, Vachon PJ, Rosenbloom L, Shavelle RM, Wu YW. Growth patterns in a population of children and adolescents with cerebral palsy. Dev Med Child Neurol. 2007;49(3):167–71.
10. Preetika C, Vivek KA. Oral status of a group of cerebral palsy children. J Dent Oral Hyg. 2011;3(2):18–21.